

## COMPARATIVE ANALYSIS OF THE NATURAL GAS SECTOR IN UKRAINE AND THE CZECH REPUBLIC, THREATS AND DEVELOPMENT PROSPECTS

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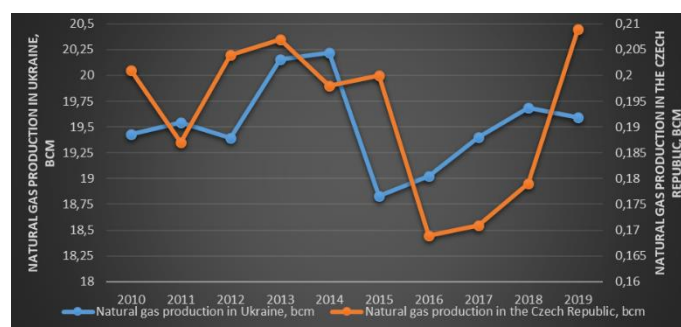
### ABSTRACT

The natural gas sector plays a significant role in the energy sector. In Ukraine, natural gas accounts for about 30 % of the total consumption of energy resources, while in the Czech Republic only about 16 %. The article presents a comparative analysis of the natural gas sector in Ukraine and the Czech Republic in 2010–2019. The dynamics of changes in the production and consumption of natural gas in the discussed countries was presented. The structure of primary energy consumption, including natural gas, in 2018 and 2019 was analyzed. The analysis also covered the import of natural gas to Ukraine and the Czech Republic for own demand. Ukraine still has to import natural gas to meet its own demand, but in recent years, there have been drastic changes in the import of natural gas – and import dependency has decreased by about 24 % in the analyzed period [1,2]. On the other hand, in the Czech Republic, the import of natural gas fluctuated within a limited range, and the import dependence increased by about 27 % compared to 2010 [1,3,4]. The article also deals with the problems of the gas pipeline system supplying natural gas from Russia to European countries.

**Keywords:** Energy resources; Natural gas; Natural gas import.

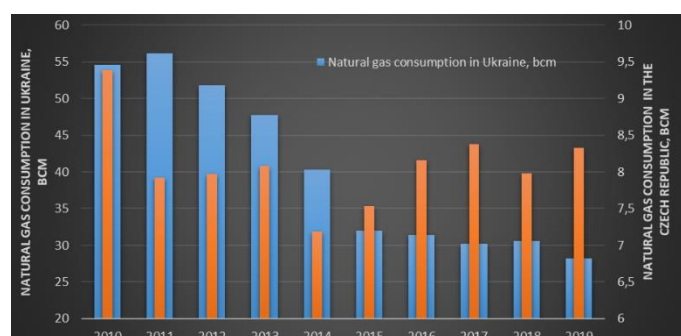
## 1 PRODUCTION AND CONSUMPTION OF NATURAL GAS IN UKRAINE AND THE CZECH REPUBLIC – INTRODUCTION

On the beginning of this article we have to show the dynamics of changes in natural gas production in Ukraine and the Czech Republic in 2010–2019.



*Figure 1. Dynamics of change in natural gas production in Ukraine and the Czech Republic in 2010–2019 [bcm] [1,3,5,6]*

From the Figure 1 we can read these important facts: in 2010–2012, natural gas production in Ukraine fluctuated at the level of 19.4–19.6 bcm annually, then in 2013 and 2014 an increase in natural gas production was recorded by approximately 4 % and 0.3 %, respectively, until 2012 and 2013. In 2015, there was a decrease in natural gas production in Ukraine by approximately 6.9 % compared to 2014, which was caused by the political situation and the annexation of part of the country's territory. In 2015–2019, natural gas production increased again, which in 2019 was approximately 5.7 % compared to 2015. In the Czech Republic, the situation with natural gas production in 2010–2019 was similar to that with natural gas production in Ukraine. In 2011, there was a decrease in the production of natural gas in the Czech Republic by approximately 7 % compared to 2010, and then until 2013 there was an increase in natural gas production by approximately 10.7 % compared to 2011. In 2013–2016 there was a drastic decrease in natural gas production by approximately 18.3 % compared to 2013, followed by an increase in natural gas production in 2016–2019 – in 2019 the increase was approximately 23.7 % compared to 2016. In 2019, Ukraine produced approximately 19.6 bcm of natural gas, while in the Czech Republic only 0.209 bcm – which is 94 times lower than the production of natural gas in Ukraine.

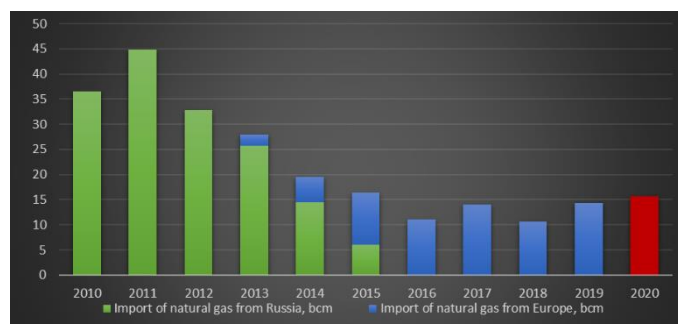


**Figure 2.** Dynamics of change in natural gas consumption in Ukraine and the Czech Republic in 2010–2019 [bcm] [1,7,8]

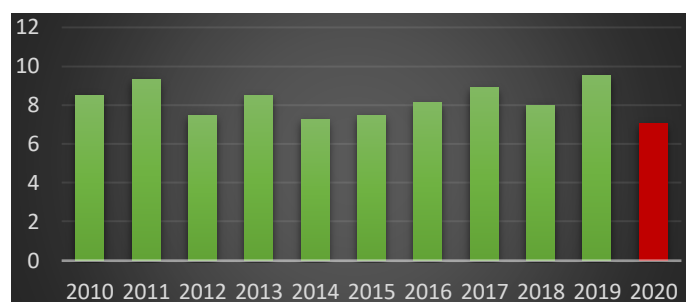
Figure 2 shows the dynamics of change in natural gas consumption in Ukraine and the Czech Republic in 2010–2019. During the analyzed period, a decrease in the consumption of natural gas in Ukraine was observed. In 2015, the decrease in natural gas consumption was approximately 41.4 % compared to 2010. In the following years, the decrease in natural gas consumption was moderate and in 2019 it amounted to approximately 11.8 % compared to 2015. Overall decrease in natural gas consumption in 2019 in Ukraine it was about 48.3 % compared to 2010. In the Czech Republic, the situation with the consumption of natural gas in the analyzed period is slightly different. In 2011, the consumption of natural gas decreased by approximately 15.6 % compared to 2010, and in the years 2011–2013 there was an increase in natural gas consumption by approximately 2 % compared to 2011. In 2014, there was another decrease natural gas consumption by approximately 11 % compared to 2013. In 2014–2017, an increase in the consumption of natural gas was recorded in the Czech Republic – in 2017, the increase was approximately 16.4 % compared to 2014. In the following years 2017–2019, consumption natural gas oscillated around 8.4–7.9 billion m<sup>3</sup> annually. In 2019, the overall decrease in natural gas consumption in the Czech Republic was around 11.3 % compared to 2010. Annual natural gas consumption in the Czech Republic in 2019 was 8.32 bcm, while in Ukraine it was around 28.2 bcm – which is 3.4 times higher than the consumption of natural gas in the Czech Republic.

## 2 NATURAL GAS IMPORTS TO UKRAINE AND TO THE CZECH REPUBLIC

In 2011, natural gas imports to Ukraine increased by 22.4 %. In 2011–2016, a drastic decrease in natural gas imports to Ukraine was recorded, which amounted to approximately 75.2 %. From 2016 to 2019, natural gas imports to Ukraine fluctuated at the level of 11.1–14.3 bcm per year. In 2020, natural gas imports amounted to about 15.6 bcm – data given for 11 months, but this is more than 9 % compared to 2019 in 12 months. Until 2013, Ukraine imported natural gas from Russia, but since 2013 the direction of natural gas imports slowly began to change. In 2016, Ukraine completely stopped importing natural gas from Russia. Until now, natural gas is imported in the direction from Europe. Figure 3 shows the dynamics of natural gas import to Ukraine in 2010–2020.



**Figure 3.** Dynamics of natural gas import to Ukraine in 2010–2020 [bcm] [2,9,10]



**Figure 4.** Dynamics of natural gas imports to the Czech Republic in 2010 – 2020 [bcm] [3,5,6,11]

Figure 4 shows the dynamics of natural gas imports to the Czech Republic in 2010–2020. In 2010–2019, the import of natural gas for the Czech Republic's own needs fluctuated in the range of 7.2–9.6 bcm per year. In 2020, natural gas imports amounted to approximately 7.04 bcm – data given for 11 months, but this is approximately 26 % less than in 2019 for 12 months.

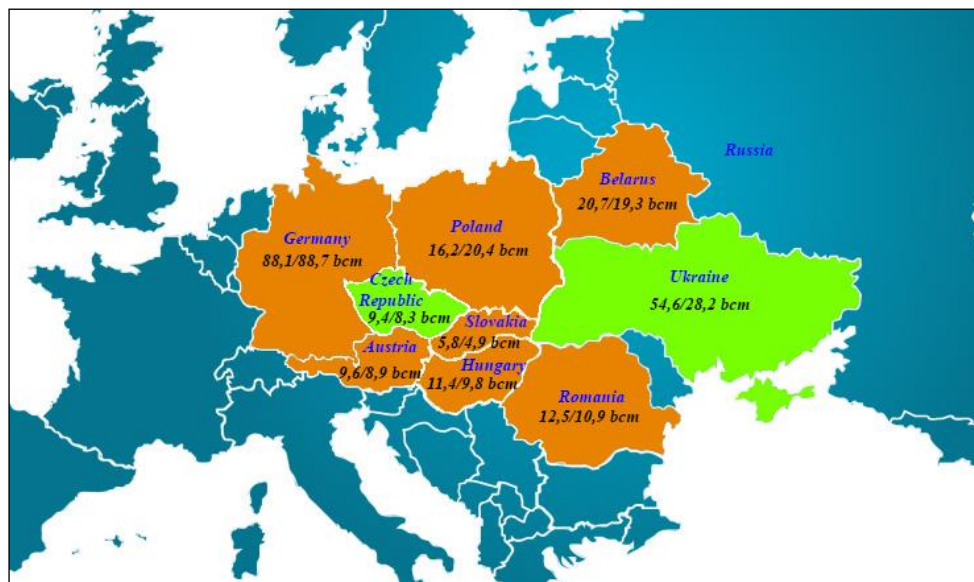
### 3 GAS PIPELINE SYSTEM FROM RUSSIA TO EUROPEAN COUNTRIES. SELECTED NATURAL GAS NEEDS OF EUROPEAN COUNTRIES

Russia is the main exporter of natural gas through gas pipelines to European countries. Figure 5 shows the gas pipelines from Russia to European countries.



**Figure 5.** Natural gas pipelines from Russia to Europe [12]

There are four directions of natural gas supply via gas pipelines from Russia to European countries: via the Baltic Sea (Nord Stream), via Belarus (Yamal-Europe), via Ukraine (Soyuz, Brotherhood) and via the Black Sea (Blue Stream). The capacity of Nord Stream 1 is approximately 55 bcm per year [13]. The Yamal-Europe gas pipeline can transport approximately 33 bcm of natural gas annually [14], while Blue Stream has a capacity of approximately 16 bcm per year [15]. The gas pipelines through Ukraine have the highest capacity – their capacity is around 146 bcm annually [16].



**Figure 6.** Natural gas consumption in neighboring countries with Ukraine and the Czech Republic in 2010 and 2019 [1,17]

Figure 6 shows the consumption of natural gas in the neighboring countries of Ukraine and the Czech Republic in 2010 and 2019. In Belarus, natural gas consumption in 2019 decreased by approximately 7.2 % compared to 2010 and amounts to approximately 19.3 bcm annually. In Germany and Poland, the consumption of natural gas in 2019 increased by approximately 0.6 % and by approximately 25.9 % compared to 2010 and amounted to approximately 88.7 bcm and 20.4 bcm annually, respectively. In 2019, natural gas consumption in Austria was around 8.9 bcm per year (a decrease of about 7.3 % compared to 2010), in Slovakia it was about 4.9 bcm per year (a decrease of about 15.5 % in compared to 2010), in Hungary it was at the level of approximately 9.8 bcm per year (a decrease of approx. 14 % compared to 2010) and in Romania it amounted to approximately 10.9 bcm per year (a decrease of approximately 12.8 % compared to 2010). The dependence of European countries on imported natural gas in 2019 increased to approximately 57.4 % compared to 2010 (approximately 50.1), while in 2019 natural gas consumption decreased by approximately 16.4 % compared to 2010 [1].

## 4 CONCLUSIONS

Natural gas production in both Ukraine and the Czech Republic fluctuated within a certain range in the analyzed period, but compared to Ukraine, the Czech Republic's natural gas production was at a low level and accounts for only 1/97 of the natural gas production in Ukraine. On the other hand, the consumption of natural gas in Ukraine had undergone significant changes as evidenced by a drastic decrease in natural gas consumption by approximately 48.3 % in the analyzed period. The Czech Republic also recorded a decrease in natural gas consumption, which in 2019 was approximately 11.3 % compared to 2010. In 2019, natural gas consumption in Ukraine was approximately 30 % of the total primary energy consumption, while in the Czech Republic the share of natural gas in the structure of consumption of energy resources amounted to approximately 16 %.

In the analyzed period, the import of natural gas to the Czech Republic fluctuated in the range of 7.2–9.6 bcm per year. In Ukraine, natural gas imports decreased drastically by about 60.9 % compared to 2010. During this period, Ukraine changed the direction of natural gas supplies, giving up natural gas supplies in the direction from Russia. Ukraine's import dependency is still very high – around 50.7 %, but in the Czech Republic this rate is even higher.



Demand for natural gas in European countries is decreasing, but import dependency is increasing. Natural gas exports through gas pipelines for the Czech Republic was better than for Ukraine. In the case of the Czech Republic, which is located in the central part of Europe, the change in the directions of natural gas exports will have a smaller impact, because the system is connected to the Nord Stream direction as well as to the route through Ukraine. In contrast, Ukraine may lose a large part of natural gas transit through its own system.

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